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ARCHAEOLOGY OF DEATH AND FORENSIC SCIENCES IN MOSTEIRO DA LUZ, SÃO PAULO, BRAZIL: THE EXCAVATION CAN MAKE A DIFFERENCE IN FORENSIC ANTHROPOLOGICAL STUDY OF MUMMIES AND SKELETONS

Abstract: This paper presents the preliminary results of the Archaeographic Plan of Action of the graves of religious in the Mosteiro da Luz, founded in 1774 and now in the central area of São Paulo, the largest and most urbanized city in Brazil. In the old cemetery inside a small chapel, 6 wall graves were found, and 1 soil grave with a funerary headstone. The procedures for preliminary archaeography were satisfactory to assist in mapping the spatial distribution of the human remains: use of burial terminology, subsuperficial scanning, photogrammetry, drawing and digital photography. Through the methods and techniques of forensic archaeology, there were identified, documented and preserved *in situ* 3 mummies and 6 skeletons. A major risk, that determined an emergencial intervention for the site preservation, was the building infestation by the exotic subterranean termite, *Coptotermes gestroi*, that imposed severe bioturbation to most corpses. Termite bioturbation can now be assigned as a major risk for the archaeological and anthropological patrimony in urban areas in Brazil.

Introduction

The Mosteiro da Luz (Figure 1), founded in 1774 and built between the years 1774 and 1802 by Fray Antonio de Sant'Anna Galvão (elected the first Brazilian Saint in 2007), is located in the neighborhood of "Luz", the city center of São Paulo and in 1988 was declared a monument "Cultural Heritage of Humanity" by UNESCO. Its historical value as representative of sacred buildings of the State of São Paulo of the eighteenth and nineteenth centuries resulted in the toppling by the Institute of National Historical and Artistic Heritage (IPHAN) in 1943 and the Council of Defense of Cultural Heritage, Artistic and Architectural of the State of São Paulo (Condephaat) in 1979 (BOVE *et al.*, 1996).

Currently residing in the monastery there are thirteen closed Concepcionists nuns, belonging primarily to the Collection of Our Lady of Divine Providence which in 1929 was added to the Order of Concepcion by Dom Duarte (also known by Order of the Immaculate Conception), a religious institute founded by Santa Beatriz da Silva in Toledo, Spain, in the year 1484 (BOVE *et al.*, 1996).

The monastery houses, yet, the Museum of Sacred Art of São Paulo, which holds a collection of about 4,000 pieces related to the religious cult, and the chapel of Nossa Senhora da Luz.

In February 2008, the previously unexplored and old cemetery that exists inside the building (Figure 2) was evaluated due to a severe infestation of the exotic subterranean termite, *Coptotermes gestroi*, which is the most important pest termite in the southeast region of Brazil and is continuously expanding its geographic distribution in recent decades (FONTES & MILANO, 2002). Emergencial control measures also included the opening of a carnarium, in order to identify termite invasion and nesting inside the closed burial cavity, and to evaluate de occurrence of termite bioturbation in the human remains.

A mummified body was found, with signs of termite bioturbation either of the bones as of the mummified soft tissues, and the skeleton of a second individual also exhibited severe signs of termite damage (Figure 3); the latter was most probable also mummified untill recently, but the mummy was virtually destroyed by termites. Then, an exhaustive search for historical documentation of the monastery was initiated, in order to obtain data of the mortuary tombs. The data obtained, however, are imprecise and generated doubts about the location of all the graves described, which probably contains the remains of the founder and/or other pioneering nuns.

This work was signed with the IPHAN, with participation of the Institut of Legal Medicine (IML), Police Academy (ACADEPOL), Museum of Archaeology and Ethnology of the University of São Paulo (MAE/USP) and Museum of Sacred Art of São Paulo (MAS).

Material and methods

The methods of identifying archaeological sites included documentary sources, as old record and chronicle manuscript books, printed books concerning the monastery, taphonomic evidences and rescue archaeology (RENFREW & BAHN, 1993; DUPRAS *et al.*, 2005).

The archaeological intervention was initially designed to be restricted to the internal area of the cemetery. The operation aimed at maximizing the information with minimal direct intervention for the control of the termite infestation. No chemical products (insecticides) were applied at the archaeological site, but evidently this action does not excluded the possibility of past contamination of the archaeological material by chemicals, due to unreported actions for the control of chronicle termite infestation in other areas of the building; — in the last two decades, the building was submitted to control actions based on concepts that are now proscribed or ineffective.

The multidisciplinary team or researchers work with the purpose of producing a general knowledge about the funerary practices of the church from the XVIII century to the first decades of the XX century, concerning especially the Order of the Concepcion nuns and the degradation biological processes operating in this type of historical archaeological site with the presence of human remains (MORAIS *et al.*, 2008).

The archaeological site was mapped through GPS (Global Positioning System; UTM 23 K, 333481 E, 7396828 N 23rd 31 '49 "South, 46, 37' 52" West) (MORAIS *et al.*, 2008).

A prospective screening trial for subsurface anomalies was performed with a GPR (ground penetrating radar), by the company Geopesquisas®. This non-destructive and non-invasive technique enable the detection of geophysical anomalies in the soil through the use of various energies (RENFREW & BAHN, 1993). The survey revealed voids in the soil grave and wall graves, contributing to the archaeological research design.

The systematic archaeological interventions were initiated by the archaeological investigations of the architectural structure of the complete room. It was later followed by the removal of the facades of the tombs in the wall, layer by layer from the outermost (layers of painting) to the inner brick wall that gave access to the human remains. These were not visible at once, since they the bodies were covered with a thick layer of earth (Figure 4).

The disclosure of the contents of the tombs was made through the use of methods and techniques of traditional archaeology (ROSKAMS, 2001; BALME & PATERSON, 2006; COX *et al.*, 2009), which prove the reliability of the data and provides the most accurate information that most interest to archeologists (RENFREW & BAHN, 1993). The excavations were performed in vertical and horizontal plans in small areas by artificial levels within predefined grid, field methods that proved to be adequate and more suitable for the illustration of the human remains (Figure 5).

Results

The archeological work revealed six tombs in the walls, five of which are being explored. Human remains of two individuals were found inside each of four tombs (Figures 6-8), and one individual inside one tomb. Three bodies are mummified and 6 are represented by skeletons; 2 skeletons are disconnected and thus are considered remains of secondary deposition. Most of the human remains exhibit severe degradation due to an urban pest subterranean termite, of the species *Coptotermes gestroi* (Figures 7-12).

The systematic withdrawal of ground that covered the bodies showed macro and micro traces of plants and animals, lime and coal. Everything has been systematically collected and documented by photos and drawings.

Discussion

From the perspective of Archaeology of the Death, of Gender, Forensic Archaeology and Forensic Anthropology (PICKERING, 1997; DUPRAS *et al.*, 2005), the preliminary archaeographic procedures and the results were satisfactory and help in mapping the spatial distribution of the human remains (skeletons and mummies): use of mortuary terminology (SPRAGUE, 2005), ground penetrating radar/GPR, photogrammetry, planialtimetry, sketches and digital photography.

The methods and techniques, also used in forensic archaeology, proved to be adequate to documentation and study of the bodies in the historical context.

The mortuary data will be analyzed in order to understand the dynamic behavior of the funeral in the Monastery and the living conditions of the nuns of the Order

of Concepcion in the century XIX. These data are related to the temperature of the internal environment of each carnarium, the relative humidity, the type of soil and the funerary practices of the religious order. The condition and characteristics of corpses are of interestd, including sex, age, stature, ancestry, diseases, causes of death and also to the recent changes promoted by termite disturbance (Figures 7-12). Termite bioturbation can now be assigned as a major risk for the archaeological and anthropological patrimony in urban areas.

Conclusions

The methods employed have been fundamental to the preservation and documentation of the archaeological material and human remains. The termite turbation imposed severe damage to many human remains that, without a careful exploration under rigorous archaeological technique, would be simply lost and unavailable for future complementary studies.

Our results are also important in the course of future studies of urban archaeology, an incipient field of research in Brazil.

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Figure 1 – Mosteiro da Luz, São Paulo, Brazil. Front view. All photos by L. R. Fontes.



Figure 2 – Mortuary chapel with six burials, a hole in floor, central altar and bow.



Figure 3 – Stage of disclosure of the contents of the burial 1. Earth layer that cover the body was partially removed.



Figure 4 – Burial 1 during the archaeological intervention.



Figure 5 – Excavation of the contents of burial 2. Note termite tunnels at the wall, at the right, and the skull with signs of termite damage.



Figure 6 – Bodies of individuals 1 (mummified) and 2 (skeletized), burial 1. Severe termite bioturbation.



Figure 7 – Detail of excavation and partial exposure of individuals 1 and 2, burial 1. Note a large termite tunnel in the head of the mummified individual 1. In the same individual, the right ear and the integument of the chin were destroyed by the termites. Individual 2 shows overall signs of termite activity.



Figure 8 – Individuals 5 (mummified) and 6 (skeletonized), burial 3. Severe termite bioturbation.



Figure 9 – Side view of the mummified body, individual 5, burial 3. The mummy was severely damaged by termites, and the thoracic and abdominal cavities, full of carton termitic structures, were virtually transformed into a termite nest.



Figure 10 – Skull of individual 3, burial 2, left view. Severe termite bioturbation.



Figure 11 – Skull of individual 3, burial 2, front view. Severe termite bioturbation.



Figure 12 – Vertebrae of individual 4, burial 2. Severe termite bioturbation.